Summary of the Invention

[0007]Not only are oligosaccharides and oligomers (multimers) found in extracts of fibers sampled directly from cotton bolls, but extracts of cotton textiles produce peaks having the same retention times, relative to **know** compounds, as do the extracts of fibers from plant material. Moreover, the same oligosaccharides and oligomers can be recovered from cotton textiles, e.g. denim, sheets and towels after prolonged wear and washings. The effect of washing is to reduce the quantity of the oligosaccharides and oligomers extracted, relative to those found in newly-manufactured textile products or cotton fibers sampled from bolls.

DELETE: know ADD: known To Read: "to known compounds"

[0008] Similar oligosaccharides and oligomers may also be extracted from woods. Twenty-two different woods have been extracted. While many of the same oligosaccharides and oligomers are found in the woods and in cotton, no two species of wood have been found to be display identical chromatograms. Thus each species of wood has a distinct signature. For example, birch and pine vary in peaks eluting between approximately 15 and 20 minutes; while balsa, a very low density wood has lower levels overall. As with the new and old cotton products, there appears to be an effect of washing and aging with woods as well. Chromatograms of teak that has been part of the deck of a sea-going vessel for nineteen years are almost indistinguishable from those of recently-harvested teak, except that the scale of the weathered teak must be expanded 4 x for the **chromatographs** to appear congruent. For both cotton and wood, a probable hypothesis is that fractions of oligosaccharides and oligomers have leached out of the **cellulose with** successive exposure to water and salts. Loss of the oligosaccharides and oligomers may indicate, and may in fact constitute, wear and loss of integrity of the fabric and wood fibers.

DELETE: chromatographs ADD: chromatograms To Read: "for the chromatograms to"

DELETE: cellulose with ADD: cell wall constituents To Read: "leached out of the cell wall consituents by successive exposure"

[0009] Various paper products also display oligosaccharides and oligomers similar to those found in cotton and wood. As with woods, every paper product tested to date has produced a unique **chromatograph**. Whereas the differences among the woods are probably due to differences in biochemistry and patterns of growth, the differences among the paper products illustrate differences in both cellulose source and in processing, such as type and degree of bleaching, coloring, and surface finishing, *etc.*

DELETE: chromatograph ADD: chromatogram To Read: "unique chromatogram"

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] Figure 1 shows the variations in multimer patterns extracted from different woods (in each instance the light trace represents the UV absorbance): a) **spalted** maple (*Acer sp.*); b) European beech (*Fagus sp.*); c) pau ferro; d) koa (*Acacia sp.*); e) aromatic cedar; f) cherry (*Prunus sp.*).

CORRECTION OF ERROR IN PUBLISHED APPLICATION: The above is correct.

[0032] Figure 2 shows a comparison of propanol P1 precipitates from HCl extracts of **spalted** figured maple versus Claro walnut.

CORRECTION OF ERROR IN PUBLISHED APPLICATION: The above is correct.

DETAILED DESCRIPTION

OF THE PREFERRED EMBODIMENTS

The following description is provided to enable any person skilled in the art to make and use the invention and sets forth the best modes contemplated by the inventor of carrying out his invention. Various modifications, however, will remain readily apparent to those skilled in the art, since the general principles of the present invention have been **defined** herein specifically to provide methods for determining identity and quality of plant cell wall materials, especially cotton fibers, and other cellulose containing products, such as wood and paper, through the analysis of selected polysaccharide fractions.

CORRECTION OF ERROR IN PUBLISHED APPLICATION: The above is correct.

Materials and Methods

[0065] ***Collection of Human Tissue***. Livers from an 18-month-old female with Pompe's disease and from two adult male accident victims were **frozen as soon as possible after death.** The Pompe's liver (α-1,4-, α-1,6-glucosidase deficiency) and the first control liver (designated "Control 1") were obtained several hours post mortem at autopsy. In the case of the second control (designated "Control 2") , the patient was an organ donor, and the liver was obtained immediately. All tissue was stored at –76°C.

DELETE: frozen as soon as possible after death

ADD: obtained at autopsy

To Read: "victims were obtained at autopsy."

[0073] Perhaps the most exciting and unexpected discovery was the finding that following the aqueous extraction it is possible to extract a multimer fraction by boiling for 30 minutes in dilute 0.1M HCl. Presumably these multimers represent some component that connects the paracrystalline cellulose within the wall. The multimers are reducing sugars, as are the GC-2 **(glyco-conjugate)** group of compounds disclosed in earlier patent applications, indicating a non-typical glycan linkage in the polymers. Hydrolysis **(alkaline)** of individual peaks has demonstrated that they contain galactose, glucose and mannose. In classical plant cell wall research dilute mineral acids are sometimes used to extract pectins or "pectic materials" which, by definition, contain galacturonic acid residues. Clearly, the multimers are neither pectins nor pectic materials. Further, it is necessary to first perform the cold aqueous extraction so that the multimers are not obscured by the GC-1 and GC-2 compounds. Further analysis of the multimers of normal fibers has revealed that the major difference between successive multimers is an addition of glucose units. That is, successive multimers in a series have comparable amounts of galactose and mannose but different amounts of glucose. It appears certain that many of these same multimers are found in a variety of cell walls. Fig. 2 shows that HCl extracts of sugar beet root tissue contains a multimer series wherein several of the compounds exactly overlap some of the cotton multimers.

DELETE: (glyco-conjugate) ADD: (glycoconjugate) To Read: "GC-2 (glycoconjugate) group"

DELETE: (alkaline) ADD: (acid) To Read: "Hydrolysis (acid) of"

UNIVERSALITY OF THE METHOD

[0075] The oligomers which are degraded to glucose by glucoamylase are, by definition, constituents of starch. However there are fractions which are not completely degrade by the glucoamylase. Barley contains a mixed ß-1,3, ß-1,4 glucan which is a major constitiuent of dietary fiber. Therefore the glucose liberated by the endo ß-1,4-glucanase from barley P1 probably originates from the barley glucan **whiled** the glucose liberated by the amyloglucosidase from the barley P1 probably originates from the amylose or starch, an α-1,4-glucan. There is a very small amount of cross activity against starch by the cellulase and against ß-glucan by the amyloglucosidase but such activity is less than 0.001% of the total activity of the enzyme.

DELETE: whiled ADD: while To Read: "barley glucan while the"